UNIVERSITÀ DI TRENTO
Department of Cellular, Computational and Integrative Biology

COSBI

Postdoctoral position available in Mathematical QSP modeling of mRNA-based products

Laboratory of Computational modeling
CIBIO Department, University of Trento

Updated application deadline: 12.00 (noon) of January 31st, 2022

The Laboratory of Computational Modeling at the University of Trento (CIBIO Department, PI Luca Marchetti), in collaboration with Fondazione COSBI, is seeking for a postdoctoral mathematical modeler with previous experience in quantitative systems pharmacology (QSP) projects, preferably applied to the area of mRNA-based products, to foster a joint investigation effort in mathematical QSP modeling of mRNA-based products (vaccines and monoclonal antibodies), in the context of the International Wellcome Leap project *"R3: RNA Readiness and Response"*.

Project description

mRNA technology has recently demonstrated the ability to change the timeline for developing and delivering a new vaccine from years to months. As member of the Laboratory of Computational Modeling at the University of Trento, the applicant will have the opportunity to join the international consortium of R3 performers, which collects a wide range of leading organizations around the world (academic institutions, biotech companies, private and public research centers), and to contribute to the development of novel mRNA-based products addressing viral and non-viral targets.

We will promote the development of quantitative mathematical models providing a systems view of the main biological processes involved in novel mRNA-based products with the aim of developing a tool able to simulate the generated immune response at organism level. The research will initially focus on predicting the pharmacodynamic profile, the potency (amount of mRNA to provide to obtain the desired response), and the reactogenicity (the quantitative extent of innate-immunity response induced by the mRNA-based product).

During the project, the successful candidate will join an interdisciplinary and highly motivated group across University of Trento and Fondazione COSBI. The candidate will be in charge of developing mathematical QSP models of novel mRNA-based products, leveraging on an effective systems biology pipeline already targeting mRNA vaccines and recently developed by the group (Leonardelli *et al.* 2021; Selvaggio *et al.* 2021).

Selected list of references

(Leonardelli *et al.,* 2021) Leonardelli L, Lofano G, Selvaggio G, et al. Literature Mining and Mechanistic Graphical Modelling to Improve the mRNA Vaccine Platforms. Frontiers in Immunology 12:3655 (2021)

A $60M PROGRAM JOINTLY FUNDED WITH CEPI
R3 RNA READINESS + RESPONSE

(Selvaggio *et al.* 2021) Selvaggio G, Leonardelli L, Lofano G, et al. A quantitative systems pharmacology approach to support mRNA vaccine development and optimization. CPT Pharmacometrics Syst Pharmacol. 10:1448-1451 (2021)

Important links
Laboratory website: https://www.cibio.unitn.it/1321/laboratory-of-computational-modeling
CIBIO Department: https://www.cibio.unitn.it
Fondazione COSBI: https://www.cosbi.eu
Wellcome Leap R3 project description: https://wellcomeleap.org/r3

Job details
Type of contract: *post-doc researcher fellowships*
Application decree numbers: 470/2021
Application call: https://www.unitn.it/en/ateneo/bando/71741/department-cibio-call-for-the-selections-for-the-awarding-of-no-1-research-fellowship-decree-no-4702
Updated application deadline: *12.00 (noon) of January 31st, 2022*
Salary: *28,850 euros/year gross (about 25,500 euros/year net)*
Duration: *1 year, renewable until project ending (2024-2025)*
Start date: *February/March 2022*
Contact person: *Luca Marchetti (PI),* luca.marchetti@unitn.it
Activity venue: *University of Trento (Laboratory of Computational Modeling), and Fondazione COSBI, Rovereto*

Your required skills and experience
Please, refer to the official call links for precise information on application requirements.

- PhD in computational biology, bioinformatics, mathematics or related fields
- Excellent English communication skills, both written and verbal
- Ability to work in team and meet project deadlines
- Mathematical/QSP modeling previous experience, ideally applied to the area of mRNA-based products
- Knowledge of the main computational techniques for mathematical model calibration, validation and qualification
- Programming skills in at least one language among MATLAB, R and Python

Desirable skills

- General understanding of biological processes and in particular of the immune response
- Knowledge of the main bioinformatics workflows for data analysis to support mathematical modeling
- Ability to work with preclinical and clinical data
- Publication record in mathematical/QSP modeling of biological processes, ideally applied to the area of mRNA-based products

Luca Marchetti is Assistant Professor and Head of the Computational Modeling Laboratory at the CIBIO Department of the University of Trento. He is also consultant at the Fondazione COSBI, where he serves as supervisor of the activities of the Computational Biology group. He has several years of experience as group leader by supervising research projects in collaboration with universities and pharma companies in the context of Hierarchical and Quantitative Systems Pharmacology (QSP) modeling. He is co-author of a textbook on mathematical modeling and of more than 40 scientific papers in international journals, books and conference proceedings. Some of his publications won international prizes for their level of contribution. He is/has been co-advisor of several stage/bachelor/master thesis and PhD students.

The Department of Cellular, Computational and Integrative Biology (CIBIO), founded in 2007, is a cutting-edge and top-ranked academic biomedicine institute within the University of Trento, organized as a hybrid research center/university department. The department has recently grown to 45 Research Laboratories headed by successful, independent, and international Principal Investigators. CIBIO Research Program focuses on four major areas: Cancer Biology & Genomics, Cell & Molecular Biology, Microbiology & Synthetic Biology, and Neurobiology & Development. The PIs pursue their goals in the frame of a holistic view of basic biological processes and of their derangement in disease, trying to establish a “double edge" model to biomedical research, in which basic science co-exists with translational approaches. CIBIO and the University of Trento provide a high level of research services, operated by highly skilled staff scientists, with all the state-of-the-art equipment and tools necessary in supporting biomedical research projects, specifically the University High Performance Computing Center and Core Facilities for High-Throughput/High Content Screening, Next Generation Sequencing, Cell Analysis and Separation, Cell Technology, Advanced Imaging, Model Organisms, Mass Spectrometry, Protein Science, and Bioinformatics.

Fondazione The Microsoft Research – University of Trento Centre for Computational and Systems Biology (COSBI) is a systems biology company founded in 2005, jointly owned by Microsoft Research and the University of Trento and turned into a foundation in 2019. With more than 15 years of activities in the field of collaborative research for pharmaceutical, food and biotech companies, COSBI represents an almost unique research center that can manage the whole systems biology pipeline starting from wet lab data, going through knowledge extraction, biomarker signature identification, contextual enrichment analysis and functional annotation, modeling and simulation. COSBI’s scientific value and productivity are reflected by the quality and volume of scientific publications as well as by the numerous international collaborations occurred in the past 15 years with Pharma, Food and Biotech companies, such as Sanofi US, NJ (USA), Amgen, CA (USA), Biogen, MA (USA), GSK Vaccines (Italy and USA), Genentech (USA), Chiesi (Italy) and Axcella, MA (USA) and with leading public research institutions, such as the Cornell University, NY (USA), the Bill & Melinda Gates Medical Research Institute, MA (USA), and the European Institute of Oncology (IT).